ATTACHMENT B
WLAN Survey: Part II Questions 5-8
June 2004

5. Describe the major external barriers to implementation of your wireless network:

Little Priest Tribal College	The lack of need for it by our students who have no wireless devices.
Bryant	Building design and signal penetration.
Bethune-Cookman College	Cost
University of Chicago	Channel separation/density is the largest drawback; also trying to implement two separate networks superimposed on each other is nightmare.
Virginia Tech	Cost
Colorado State	Unable to integrate campus voice and data services with local cellular/mobile providers

5.1 What could the federal government do to lower these barriers?

Northwestern	Having only 3 non-overlapping channels available makes deployments difficult; a larger channel range would help.
University of Chicago	Somehow limit/control products in this portion of spectrum
Virginia Tech	Continue to promote unlicensed spectrum and affordable products

5.2 Are there things the federal government could do (such as rule changes) that would make adoption of new technologies such as mesh networks, and integrated licensed/unlicensed devices easier?

Little Priest Tribal College	Unlicensed devices might help to do a remote site about 15 miles from main campus.
Virginia Tech	Lower frequency, higher speed, bands (900 MHz band and below) are needed for outside NLOS WMAN applications

5.3 Is there enough unlicensed spectrum available for your current needs? Are you concerned about future needs? How does this affect planning?

Little Priest Tribal College	Not a problem.
Bethune-Cookman College	Not a problem.
Georgetown	Currently enough unlicensed spectrum for our needs; the proliferation of additional wireless products could start to make this a problem; we would have to make sure all of these new products are coordinated in a planned deployment so as not to interfere with the current/future infrastructure.
University of Chicago	Probably yes, but since we are limited to marketed products, this is an ongoing concern.
Virginia Tech	Move from 802.11 b to g; planning for

	increased numbers of access points in the future.
Colorado State	Yes, primarily because we have a large, contiguous campus.
U of Maryland	No; but we just utilize what's available (and assume more will continue to become available.); our planning is not affected.

5.4 To what extent had line-of-sight issues been a problem for your network? Would higher speed, lower frequency (900 MHz band and below), and/or higher power transmission be desirable for better non-line-of-sight-services?

Little Priest Tribal College	Not a problem
Bethune-Cookman College	Maybe
Georgetown	Not a problem
University of Chicago	Not a problem to date; probably
Virginia Tech	LOS has been a major problem for 2.4 GHz and up bands, including LMDS
Colorado State	Deployed wireless mostly inside buildings, with very few point-to-point links; if we deploy a mobile wireless solution (to benefit the University police) the 900 MHz solution would help resolve problems with trees, etc.
U of Maryland	Not a major problem
NYU	6-7 point-to-point currently running; tons of fiber so lots of option; only one building that couldn't be reached.

5.5 What portion of your wireless network uses licensed spectrum and for what purposes? How is this expected to change in the future?

University of Chicago	None, now; integration with cellular, etc., will change this
Virginia Tech	Mostly unlicensed and that will continue to increase on campus and possibly to hot spots and hot zones around town; a regional metro wireless network is being planned that may make use of licenses and/or unlicensed band services.
Colorado State	No licensed spectrum is used for data only purposes at this time; the University funds approximately 1,400 cellular devices (faculty/staff); approximately 90% of students have cellular phones.

6. Describe the major internal barriers to implementation:

Little Priest Tribal College	Financial

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6.1 How do you finance the cost of your wireless infrastructure?

Little Priest Tribal College	EPSCOR helped with some of the access points.
Bryant	Won capital approval as special project.
Bethune-Cookman College	A combination of grants and internal funding.
Georgetown	Originally a funded project to cover high profile areas; funded now by departments by request; included in the cost for new or refurbished buildings.
Northwestern	35 of the APs were funded by the IT dept; 240 funded by departments, installed and maintained by IT.
University of Chicago	It was a budgeted technology enhancement.
Virginia Tech	Currently subsidized for pilot testing; a service fee is planned.
Colorado State	Most with central capital IT funding; some college IT funds have been contributed.
U of Maryland	Base seed cost; all expansions paid for by departments.
NYU	Funded by central IT organization.

6.2 What is your total number of WLAN support staff and total WLAN users?

Little Priest Tribal College	One staff / only a few users
Bryant	one FTE / 2,000 users
Bethune-Cookman College	Four support staff / 75 users
Georgetown	The wireless is supported by the current engineering staff/ 2,000 users
Northwestern	Multiple layers of support; basic support and network support; none dedicated / 5,200 users
University of Chicago	8 support staff who perform all network installation and repair including wired and backbone / 2,000 users
Virginia Tech	5 staff / 2,000 users; WLANs are being integrated with wired LANs, so it is difficult to differentiate.
Colorado State	5 FTE / 1,450 users; None of the staff are dedicated to wireless only.
U of Maryland	3 support / 800 users
NYU	<10 staff / 3,000 users

6.3 Does your faculty want restrictions on wireless in classrooms?

Little Priest Tribal College	One faculty member uses wireless, not an issue.
Bryant	Yes
Bethune-Cookman College	Not yet.

Georgetown	Some requests that we don't deploy wireless near their classrooms so that students aren't distracted by surfing the internet.
Northwestern	Had it mentioned but never requested; in a building that is fully covered it is hard to block access to a classroom and not a study area that may be right next door.
University of Chicago	Yes, some want the ability to turn it off at certain times.
Virginia Tech	Some do.
Colorado State	Not at this time.
NYU	Under discussion in various forms on campus; no resolution as yet

6.4 Have security concerns been a problem?

Little Priest Tribal College	Not yet.
Bryant	Have not been a problem but the issues were dominate throughout the planning and design phase.
Bethune-Cookman College	No
Georgetown	Yes, we currently run an open network and are seriously considering a change.
Northwestern	No at this time; we have users tunneled through a VPN server.
University of Chicago	Yes, moderately; of great concern is "compromised computers".
Virginia Tech	Not yet, but there is a greater potential for problems as compared to switched-Ethernet.
Colorado State	No
U of Maryland	Yes, authentication is used and VPN is recommended.
NYU	THE BIG CONCERN; currently support 3 types of clients, hopefully will be supplanted by 802.11i standard.

7. Describe what you have learned since the decision was made to install a wireless network:

Little Priest Tribal College	It is not that hard to do; it is very convenient; we will always make wireless available in new buildings

7.1 What is your list of best practices, including things that have worked exceptionally well?

Little Priest Tribal College	Our wireless access is so simple and so complete, it is a best practice; the less expensive access points work just as well as the more expensive Cisco access points.
Bryant	Include the student community in the overall process; process seems to speed up when students are the advocates.

Bethune-Cookman College	Installation isn't that hard; keep it simple; a high level of security isn't always needed at some locations.
Georgetown	Good site surveys; provide exceptional coverage in all areas that are to be covered; advise users that wireless is an adjunct to the wired network.
Northwestern	Statically set the channel on the AP rather than letting the APs auto scan; a site survey for all installs.
University of Chicago	Every installation is different, so you must do a survey; provide coverage where needed so that rogues are less likely; remove rogues; require authentication to use the wireless network; maintain the ability to identify both compromised machines and users violating policy; quarantine infected machines.
Virginia Tech	Thorough site surveys save time later; keep it simple from the user's perspective.
Colorado State	Use VPN to insure authentication and privacy (via encryption).
U of Maryland	Use Siteplanner for design.
NYU	Realize that education environment is extremely tough compared to corporate; compromises are constant; always think backwards and think legacy equipment; have a uniform methodology to connect to the network, including guests; don't skimp on number of APs; low power/high density works well; set the user expectation bar---cell phone comparison works well.

7.2 What is your list of bad practices, including things that you have learned not-to-do?

Bethune-Cookman College	It's not always necessary to outsource installation; don't buy a 2nd access point when another card and an external antenna might do the trick.
Georgetown	Originally recommended certain wireless NICs; we no longer do that.
University of Chicago	Make few or no assumptions about topology requirements; do a survey!
Virginia Tech	Sloppy work.
Colorado State	Have had occasional problems with users bridging wired and wireless LANs; still looking for a good solution to prevent this. (Cisco APs do run IOS but *do not* allow routing between the wireless and wired sides.)
NYU	Don't depend solely on proprietary solutions.

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8. Does your campus participate in a community wireless project or are you anticipating one in the future?

Little Priest Tribal College	I hope to make the college the leader in an effort to connect to the entire community into a wireless network.
Bryant	Not at this time.
Bethune-Cookman College	None anticipated
Georgetown	No
Northwestern	No
University of Chicago	No
Virginia Tech	Yes, do participate and anticipate more in the future
Colorado State	Exploring the possibility
U of Maryland	No
NYU	No and not in near future, enough existing hotspots available in neighboring areas

8.1 What are the major barriers, both internal and external, for that implementation?

Little Priest Tribal College	The major barriers are political; we hope the college can become the leader with the ability to bring the community together enough to set aside political issues and do what is right for the community.
Virginia Tech	Cost and right of way.
Colorado State	Access to towers, municipal fiber, separating various entities' wireless traffic into routable VLANs

8.2 What could the federal government do to lower these barriers?

Little Priest Tribal College	Help us increase our bandwidth; we can use that as a vehicle to support non-profit community projects.
Virginia Tech	Promote development of lower cost WMAN/WiMAX technologies for unlicensed bands.

8.3 What are the security issues?

Little Priest Tribal College	Security will need to be tight once we set up a community-wide wireless network; we will need to lead and be the key player.
Virginia Tech	Ease of use, performance, cost, …
Colorado State	Eavesdropping, masquerading, denial of service, rogue APs, airborne viruses